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# Iatrochemistry and Paracelsism in the Ottoman Empire in the Sixteenth and Seventeenth Centuries

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## Abstract

The sixteenth and seventeenth centuries saw the spread of iatrochemistry. In the second half of the seventeenth century, European iatrochemical knowledge was introduced into the Ottoman Empire through translations from Latin into Arabic. This study addresses the adoption and adaptation of this new knowledge by examining these works, as well as the medical compendium of Dāwūd al-Anṭākī and the only book written by Ibn Sallūm himself. European medical texts underwent a transformation process on a textual as well as on a conceptual level, especially regarding Paracelsism. Even before that, Dāwūd al-Anṭākī's book already contains alchemical procedures and mineral remedies for internal application, which might be described as a precursor of medical chemistry.

## Keywords

Iatrochemistry – Paracelsism – Ottoman medicine – Dāwūd al-Anṭākī – Ṣāliḥ b. Naṣrallah b. Sallūm al-Ḥalabī

## Introduction

The sixteenth century is marked by world-historical change. Spain and Portugal colonised the New World and explored the oceans. In Europe, Humanism, the Renaissance, and the Protestant Reformation gave new impulses to intellectual life and science. These changes in their turn influenced medicine. New diseases such as syphilis spread worldwide; new plants and cures found their way to Europe; and revolutionary new medical concepts and therapies

emerged. Andreas Vesalius (1514–1564) published his influential work on human anatomy, *De humani corporis fabrica* (*On the Fabric of the Human Body*). William Harvey (1578–1657) described the circulation of blood. Both proved by observation and experimentation that certain of Galen's assumptions were false. Besides, the traditional school of Galenic medicine was confronted with a new doctrine called *nova medicina*, rooted in alchemy, astrology, magic and natural philosophy. It was attributed to the Swiss-German physician Theophrastus Philippus Aureolus Bombastus von Hohenheim (c. 1493–1542), better known as Paracelsus, who broke with the orthodox medical doctrine based on humoral pathology. The university-based traditionalists or Galenists, however, rejected Paracelsus's new medical doctrine, as well as his alchemical remedies. Paracelsists and Galenists represented two antagonistic, even hostile competitors.<sup>1</sup>

In the early seventeenth century, conciliatory tendencies arose, especially as some remedies developed by Paracelsus or his followers, the Paracelsists, such as Oswaldus Crollius (c. 1560–1608), proved efficacious in healing some diseases. As the century progressed, the boundaries between the rival schools gradually began to disappear. This development was marked by a book by the eclecticist Daniel Sennert (1572–1637), professor of medicine at the University of Wittenberg, *De chymicorum cum Aristotelicis et Galenicis consensu ac dissensu* (*On the Agreement and Disagreement of the Chemical Authors with the Aristotelians and Galenists*), published in 1619. Medical chemistry (or iatrochemistry) gradually came to be integrated into the framework of academic medicine, having largely emancipated from the medical, astrological, and magical philosophical concepts of Paracelsism.<sup>2</sup>

During the sixteenth and seventeenth century, the Ottoman Empire was a powerful realm controlling south-eastern Europe, western Asia, and north Africa. As a multi-ethnic and multilingual empire, it was the ideal locus for scientific and technological exchange between eastern and western cultures. Ekmeleddin İhsanoğlu identified an era of 'Islamic science' that prevailed until the end of the sixteenth century.<sup>3</sup> In the seventeenth century, he continues, the Ottoman Empire was gradually surpassed by the European states politically, socially and scientifically, and the Ottomans adopted the technical achieve-

1 On the developments in medicine and pharmacy in the early modern period see Friedrich/Müller-Jahncke, *Geschichte*, pp. 3–78; Porter, *Greatest*, chs. 8 and 9. On Paracelsism and the conflict between Paracelsists and Galenists see Friedrich/Müller-Jahncke, *Geschichte*, pp. 267–300.

2 See Friedrich/Müller-Jahncke, *Geschichte*, pp. 306–311, 322–325.

3 İhsanoğlu, "Ottoman Science," 2.

ments that had emerged in Europe. İhsanoğlu refers to this phase as the period of ‘Western science.’ Nevertheless, the thesis of a centre–periphery transmission of knowledge has often been repudiated, most recently in *Science Between Europe and Asia*. The editors of that volume, Günergun and Raina, postulate “appropriation” and “filtering” as terms for understanding “the diversity of the processes underlying the adoption and adaptation of travelling ideas and techniques.”<sup>4</sup>

Ottoman medicine included several medical traditions that existed in parallel. On the one hand, it represented a continuation of Graeco-Arabic medicine. On the other hand, it interacted with medical concepts and practices developed in other cultures. The latter process occurred by various means, such as translation or direct contact involving a variety of actors. Jewish and Greek physicians living in the Ottoman Empire, who had studied at European universities and mastered Latin, played a crucial role in the transmission of medical knowledge.<sup>5</sup> In addition, Ottoman physicians were part of an elite of educated scholars proficient in Arabic, Persian and Turkish.<sup>6</sup> Proficiency in Persian must have opened up another channel for the exchange of knowledge, namely with Indian medicine as, under Mughal rule, several medical works were translated from Sanskrit into Persian.<sup>7</sup> As is well known, Ayurvedic medicine has a

4 Günergun/Raina, *Science*, pp. 1, 2, 9. On transmission of knowledge between Europe and the Ottoman Empire see Brentjes, *Travellers from Europe*; Küçük, *Contexts and constructions*.

5 For example Tobias Cohn (1652–1729), Daniel de Fonseca (1672–c. 1740), Hayâtizâde Muşţafâ Feyzî (d. 1692) (see Murphey, “Jewish Contribution,” pp. 61–74; and Shefer-Mossensohn, “Tobias the Ottoman,” pp. 45–66); Musa Calinus el-İsraili (fl. 16th c.) (see Kahya, “Musa Calinus el-İsraili,” pp. 49–56.); and Musa Hamon (fl. 16th c.) (see Sarı et al., “Gedanken,” pp. 57–68).

6 See Shefer-Mossensohn, *Ottoman Medicine*, pp. 185–187.

7 For example *Majmūʿa-yi Shamsī* (Collection of Shams) by Khwāja Shams Mustawfī that was likely compiled around or during the first decade of the fourteenth century (see Fabrizio Speziale “Majmūʿa-yi Šamsī,” *Perso-Indica. An Analytical Survey of Persian Works on Indian Learned Traditions*, eds. F. Speziale and C.W. Ernst, [http://www.perso-indica.net/work/majmua-yi\\_samsi](http://www.perso-indica.net/work/majmua-yi_samsi); accessed 30 June 2015). Another work that contains the preparation and the uses of the oxides of different metals is *Majmūʿa-yi Žiyāʾ* (Collection of Žiyāʾ) written by Žiyāʾ Muḥammad Masʿūd Rashīd Zangī ʿUmar Ghaznawī during the reign of the sultan of Delhi, Muḥammad b. Tughluq (r. 1325–1351) (see *ibid.*, [http://www.perso-indica.net/work/medicine/majmua-yi\\_diya](http://www.perso-indica.net/work/medicine/majmua-yi_diya); accessed 30 June 2015). A further work of the fifteenth century is *Tajribāt al-mujarrabat-i Ghiyāth-shāhī* (The experiences of the tested prescriptions of King Ghiyāth) by Saʿd Allāh Nizāmī Zanjānī (*ibid.*, [http://www.perso-indica.net/work/medicine/tajribat\\_al-mujarrabat-i\\_giyat-sahi](http://www.perso-indica.net/work/medicine/tajribat_al-mujarrabat-i_giyat-sahi); accessed 30 June 2015). Further translations from the sixteenth century can be found on <http://www.perso-indica.net/work/medicine>.

long tradition of healing with minerals and chemical remedies.<sup>8</sup> Ultimately, all these traditions were integrated in a protracted and continuous process that Shefer-Mossensohn describes aptly as the “localisation and Ottomanisation” of medicine.<sup>9</sup>

Nevertheless, the exchange of knowledge between the Ottoman Empire and its neighbouring cultures with regard to iatrochemistry has not yet been thoroughly addressed.<sup>10</sup> To explore the underlying process, several factors need to be considered with regard to classical Islamic medicine, to Ayurvedic medicine in Persian translations, to European medicine, and to ‘Ottoman’ medicine. In the second half of the seventeenth century, translations from Latin into Arabic were commissioned by the imperial chief physician Şalîh b. Naşrullâh Ibn Sallûm al-Ḥalabî (d. 1669). Nevertheless, we must consider the existing recipes and remedies that contain mineral and chemical substances in Ottoman medical compendia prior to these translations. Therefore, the present contribution also examines the encyclopaedic work *Tadhkirat ûlî al-albâb wa-al-jâmi‘ lil-‘ajab al-‘ujâb* (*Memoranda of the Intelligentsia and Compendia of Curiosities*) by the Ottoman physician Dâwûd al-Anţākî (d. 1599), often regarded as a scholar of classical Islamic medicine, and compares the relevant paragraphs with Ibn Sînâ’s (d. 1037) *al-Qanûn fî al-ṭibb* (*Canon of Medicine*) to identify the novel content in the *Tadhkira*. In addition, this study addresses the works translated on behalf of Ibn Sallûm: *Ghāyat al-itqân fî tadbîr badan al-insân* (*Utmost Perfection in the Treatment of the Human Body*), *al-Ṭibb al-kîmiyâ’i al-jadîd* (*The New Chemical Medicine*), which includes *al-Kîmiyâ’ al-malakîya* (*The Royal Chemistry*), and *Tarjamât al-Aqrâbâdhîn al-jadîd* (*The Translation of the New Antidotarium*). Finally, it addresses *Ġāyet ül-beyân fî tedbîr beden il-insân* (*Utmost Explanation in the Treatment of the Human Body*), the only work demonstrably authored by Ibn Sallûm himself. This study shows that medical chemistry already existed in Arabic medical compendia prior to the works contributed to Ibn Sallûm, although the translations from Latin into Arabic and Ottoman played a crucial role in the adaptation of European iatrochemistry and the shaping of ‘Ottoman’ medicine.

8 See for example Wujastyk, “Perfect Medicine: Mercury in Sanskrit Medical Literature;” Dash, *Alchemy and metallic medicines in Āyurveda*.

9 See Shefer-Mossensohn, *Ottoman Medicine*, pp. 182–185.

10 Bachour’s study mainly addresses Paracelsism (Bachour, *Oswaldus*); see the contributions of Sarî (Sarî, “Ottoman Medical Practise,” pp. 5–89; Sarî/Zülfikar, “The Paracelsusian Influence,” pp. 157–179) and of Savage-Smith (Savage-Smith, “Drug Therapy,” pp. 3–28).

### Chemical Remedies in Dawūd al-Anṭākī's *Tadhkirat ūlī al-albāb*

In classical Arabic medicine, as Ullmann suggests, a separation between alchemy and medicine regarding the philosophy of healing and the preparation of compound medicines existed.<sup>11</sup> Nevertheless, if we examine the *Tadhkira* of al-Anṭākī we find several indicators of the integration of alchemical praxis into medicine. Fabian Käs already noticed that al-Anṭākī must have utilised alchemical texts in order to describe the formation of minerals, and that he was acquainted with alchemical *Decknamen* or pseudonyms, using them to indicate some minerals.<sup>12</sup> The *Tadhkira* includes further evidence for al-Anṭākī's alchemical knowledge, and of its integration into the preparation of remedies.

First of all, al-Anṭākī explains in detail certain alchemical procedures used to prepare some substances, while Ibn Sīnā merely mentions these substances. For example, in Ibn Sīnā's *Canon of Medicine*, the "clay of philosophy" (*ṭīn al-ḥikma*) is mentioned twice without further elaboration.<sup>13</sup> Al-Anṭākī, however, explains its preparation method:

The clay of philosophy is a clay needed in medicine to stabilise the distillation apparatus to broil it. To prepare it, take one part of pure clay (*ṭīn khālīṣ*), half a part of triturated coal (*faḥm mashḥūq*), cut hair (*sha'r maqṣūṣ*), calcinated salt (*milḥ mukallas*), marsh mallow (*khiṭmī*), slag of iron (*khabath al-ḥadīd*), calcinated eggshell (*kils qishr al-bayḍ*). Sieve [the mixture] and knead it thoroughly with saliva (*al'iba*), vinegar (*khall*) or milk (*laban*). The more fermentation it undergoes, the more sufficient it is.<sup>14</sup>

Ibn Sīnā indicates that tutty (*tūṭiyā*) can be prepared by sublimation, but there is no description of a sublimation method.<sup>15</sup> In al-Anṭākī's *Tadhkira*, again, a concrete method is described:

Tutty (*tūṭiyā*) is either natural [...] or artificial [synthesised] from triturated calamine (*iqḷīmīyā*). If doused in portions through the cup of an

11 Ullmann, *Medizin*, p. 129.

12 Käs, *Mineralien*, p. 193. For example 'aqrab (scorpion) as a pseudonym for sulfur (*kibrīt*), 'uqāb (eagle) for ammoniac salt (*nūshādar*), al-unthā (female) for mercury (*zī'baq*), 'alam (banner) for arsenic (*zīrnīkh*) etc. (al-Anṭākī, *Tadhkira*, vol. 1, pp. 239, 184).

13 Ibn Sīnā, *Qānūn*, vol. 3, pp. 113, 1545.

14 Anṭākī, *Tadhkira*, vol. 1, p. 234.

15 Ibn Sīnā, *Qānūn*, vol. 2, pp. 752–753.

aluthel on melted copper, it sublimes and can be gathered in the same way as mercury is sublimated.<sup>16</sup>

Besides, al-Anṭākī describes the distillation of several mineral spirits not mentioned by Ibn Sīnā.<sup>17</sup> He even recommends some of them to be applied internally.<sup>18</sup> The aqua of *bītā'* (*mā' bītā'*) was given by the governor of Aden (*ṣāḥib 'Adan*) as a gift to the director of the Maṣṣūrī hospital in Cairo (*ṣāḥib al-bīmāristān al-Manṣūrī*). It is used internally to heal the ulcers of the stomach (*qurūḥ al-ma'ida*) and prepared as follows:

- 16 Anṭākī, *Tadhkira*, vol. 1, p. 99. The same phenomenon is observed in other passages on mineral, animal and herbal substances. I give three further examples: While Ibn Sīnā merely mentions that the crystalline form of ammoniac salt (*nūshādar*) is the best sort of ammoniac, al-Anṭākī gives detailed information on its various kinds and their extraction methods, differentiating between natural (*ṭabīʿī*) and artificial (*maṣnūʿ*) sorts. The latter are extracted during the sublimation (*ṭaṣʿīd*) of minerals in furnaces, or prepared by distillation (*taqṭīr*) of the hair (Ibn Sīnā, *Qānūn*, vol. 2, p. 624; Anṭākī, *Tadhkira*, vol. 1, p. 333). Secondly, Ibn Sīnā merely writes that the oil of eggs (*duhn al-bayḍ*) is prepared by distillation. Al-Anṭākī gives a concrete description of the procedure, which involves stuffing eggs in the cucurbita and distilling it several times (Ibn Sīnā, *Qānūn*, vol. 5, p. 2412; Anṭākī, *Tadhkira*, vol. 2, p. 43). The third example is of *ghālīya*, an odoriferum composed of musk (*misk*), amber (*'anbar*) and aloes (*'ūd*), as al-Ṣaḥārī, a disciple of Ibn Sīnā, explains in his medical lexicon, *Kitāb al-Mā'* (Ṣuḥārī, *Kitāb al-Mā'*, vol. 3, p. 111). Ibn Sīnā gives no description of the drug, simply stating that it was a common remedy (*dawā' ma'rūf*). Al-Anṭākī gives an elaborate description of the distillation methods of the drug, with several variations of the ingredients (Ibn Sīnā, *Qānūn*, vol. 2, p. 798; Anṭākī, *Tadhkira*, vol. 1, p. 244).
- 17 Distillation was also used by al-Anṭākī to identify the temperament of simples. Once distilled in the cucurbita and alembic, a simple drug separates into four parts: fluid (*mā'ī*), foam (*zabad*), sublimate (*ṣā'īd*) and solid (*thābit*), correlating with the elements water, air, fire and earth, respectively (Anṭākī, *Tadhkira*, vol. 3, p. 186).
- 18 Mineral oils or spirits were a major component of iatrochemical remedies used in Europe. They were synthesised either from simple drugs, e.g. spirit of ammoniac salt (contains approximately 10% ammonia and ammonium carbonate), spirit of vitriol (contains approximately 3% sulphuric acid), spirit of salt (contains hydrochloric acid), and spirit of tartar (contains mainly potassium carbonate); or from a combination of minerals, sometimes in combination with herbal components such as the composed spirit of tartar (prepared from tartar, ammoniac salt and spirit of tartar) or the aromatised spirit of ammoniac salt (prepared from ammoniac salt in combination with aromatic herbals as cinnamon, cloves, bitter orange or nutmeg) etc. (Schneider, *Lexikon*, vol. 2, pp. 184–189; vol. 3, pp. 38, 39, 59, 125). The oils were more concentrated solutions than the spirits: for example, oil of vitriol contains approximately 75% sulphuric acid, compared to only 35% in spirit of vitriol (Schneider, *Lexikon*, vol. 3, pp. 38, 39).

Take one part of ajwain (*nānakhwāh*) and cinnamon (*dāršīnī*), half a part of magnetite (*maghnāṭīs*) and pearl (*lu'lu'*), and a quarter part of ammoniac salt (*nūshādar*). Triturate the ingredients, douse [the mixture] with ten times its quantity of distilled vinegar (*khall muṣa'ad*) and distil it (*tuqaṭṭar*) three times.<sup>19</sup>

The aqua of *marmiyāsūs* (*mā' marmiyāsūs*) is attributed to Balīnās.<sup>20</sup> It was used externally to remove haemorrhoids (*bawāsīr*), vitiligo (*bahaq*) and cicatrices (*wasm*). A caustic mixture of several mineral acids must have resulted after distillation:

Take one part each of sweet and bitter salt (*milḥ ḥulw wa-murr*), nitrate of potash (*milḥ andarānī*), borax (*bawraq*), ammoniac salt (*nūshādar*) and hair (*sha'r*); half a part each of saltpetre (*bārūd*), alum (*shabb*), eggshells (*qishr bayḍ*). Dissolve (*tuḥall*), precipitate (*tu'qad*), triturate (*tushaq*) and douse [the mixture] with aqua of colocynth (*mā' al-ḥanṣal*) that contains one-tenth part of alkali (*milḥ qalī*) and [finally] distil it seven times.<sup>21</sup>

The aqua of *ma'shar* (*mā' ma'shar*) is a further distillate described in the *Tadhkira*. Al-Anṭākī confirms that it is not lethal (*qattāl*), as had been thought, and that he has frequently applied it internally (*saqaynāhu kathīran*) against ulcers of the lung (*qurūḥ al-rī'a*), humid cough (*su'āl raṭb*) and blockages (*sudud*). It was prepared by roasting one part each of saltpetre (*bārūd*) and ammoniac salt (*nushādar*) seven times in dough (*'ajīn*), triturating and mixing the mass with egg white (*bayāḍ bayḍ*) and distilling the mixture.<sup>22</sup> The distillate must have contained nitric acid.<sup>23</sup>

The aqua of the 'miracle drop' (*mā' al-nuqṭa al-khāriqa*) is prepared by taking one part tartar (*tarṭīr*), half a part of salt (*milḥ*), triturating them with nine parts of vinegar (*khall*) and distilling the mixture.<sup>24</sup> After distillation, a

19 Anṭākī, *Tadhkira*, vol. 1, p. 289.

20 Balīnās, an authority who is often cited in Arabic hermetic literature, might refer to the Neopythagorean Greek philosopher Apollonios of Tyana (d. 100). See Ullmann, *Geheimwissenschaften*, pp. 176, 378.

21 Anṭākī, *Tadhkira*, vol. 1, p. 289.

22 Ibid., p. 290.

23 A similar method of dry distillation was described in *al-Kīmīyā' al-malakiyya* to prepare the spirit of saltpetre (*rūḥ al-bārūd*; compare Ibn Sallūm, *al-Kīmīyā'*: Ayasofia 3671, f. 39v).

24 Anṭākī, *Tadhkira*, vol. 1, p. 290.



mixture of distilled vinegar and tartaric spirit must have resulted. According to al-Anṭākī, the distillate destroys kidney stones (*yufattitu al-ḥaṣā*) and triggers the excretion of phlegmatic humours (*akhlāt lazija*) if taken internally. Al-Anṭākī notes that the spirit of the 'miracle drop' was invented by 'the shaykh' who recorded it in his books *al-Mujarrabāt* (*The Tested Drugs*) and *al-Shifā'* (*The Healing*) (*mā' al-nuḡṭa al-khāriqa min istinbāt al-shaykh qarrarahū fī al-Shifā' wal-Mujarrabāt*). The identity of the shaykh was discussed by Käs, who noted that this title refers to a "sinister astrologer" in connection with the book named *al-Shifā'*, whereas al-Anṭākī refers to Ibn Sīnā as shaykh in reference to his *Canon of Medicine*.<sup>25</sup> *Al-Shifā'* might be referring to *Shifā' al-asqām wa-dawā'* *al-ālām* ("Healing of Diseases and Cures of Pain"), a widespread medical compendium written by Ḥusām ul-Dīn el-Aydīnī or Hācī Paşa (d. 1417), a physician who originated from Aydın in western Anatolia and lived in Egypt in the fifteenth century.<sup>26</sup> Unfortunately, the work of this scholar has not yet been the subject of research, and therefore the identity of the shaykh remains unclear.

In addition to aqua of *bītā'*, of *ma'shar*, and of the miracle drop, al-Anṭākī applies further alchemical preparations internally. He administers pearls as a solution in vinegar, in contrast to Ibn Sīnā who merely recommends triturating them thoroughly for good absorption because of their density (*kathifat al-jawhar*).<sup>27</sup> Another solution of pearls (*maḥlūl al-lu'lu'*) was described in the *Tadhkira*, namely by putting the pearls into a bottle (*qārūra*), filling it with the sour juice of citron (*ḥammād al-utruj*), sealing, and leaving the preparation in a bath until the pearls dissolve.<sup>28</sup>

Al-Anṭākī applies the spirit of ammoniac internally as well. He distils ammoniac salt (*nūshādar*) with hair (*'udhra*), and uses the distillate as an antidote (*akhraja al-samm*).<sup>29</sup> Furthermore, to remove foreign matter stuck in the pharynx (*'alaq*), such as iron or thorns, al-Anṭākī recommends a tested remedy (*min mujarrabātīnā*) that contains one part shavings of magnetite (*maghnāṭīs*) dissolved with one-tenth part of ammoniac salt (*nushādar*). One dram (*dirham*) is to be drunk with the aqua of common rue (*mā' al-sudhāb*). If the foreign matter

25 Käs, *Mineralien*, p. 192.

26 See İhsanoğlu et al., *Osmanlı Tıbbi*, vol. 1, pp. 18–33. *Shifā' al-asqām wa-dawā' al-ālām* was among the most popular medical books in the Ottoman empire, as Sabev's study on book inventories in private and public Ottoman libraries shows (see Sabev, "Medical Books," pp. 615–628).

27 Anṭākī, *Tadhkira*, vol. 1, pp. 285, 295; Ibn Sīnā, *Qānūn*, vol. 1, p. 362.

28 Anṭākī, *Tadhkira*, vol. 1, p. 195.

29 Ibid., vol. 1, p. 333.

is not expelled from the body but has reached the stomach, one must drink a bitter drug like birthwort (*shūḥ*) or lupine (*turmus*) with vinegar (*khall*).<sup>30</sup>

Finally, al-Anṭākī applies a chemical derivative internally whose internal application was highly controversial among Galenists in Europe, namely mercury and its derivatives. He recommends pills that were allegedly invented in the hospital in Cairo (*mustaḥdath fi al-bīmaristān*) against Persian fire (*nār fārisī*), syphilis (*ḥabb [ifranjī]*), chancroid (*ākila*) and ulcers (*qurūḥ*) and that contain mercury, sulfur and sublimated mercury (*sulaymānī*) with other herbal purgatives.<sup>31</sup> Another pill contains mercury, scammony, opium, musk and amber.<sup>32</sup> A third variety contains sublimated mercury with wheat flour, turmeric (*kurkum*), sulfur and olibanum (*lubān*). Al-Anṭākī warns against using this kind of pills, though.<sup>33</sup>

Alchemical procedures and remedies were thus integrated into the *Tadhkira* of al-Anṭākī, but what was the cause for this development? Was it initiated by contact with Indian, Persian, or European medicine, or was it an indigenous development? In the *Tadhkira*, we find many remedies that are related to Indian medicine, for instance, *anūsh dārū*, which mainly contains the syrup of Indian gooseberry (*amlaj*) mixed with several herbal ingredients.<sup>34</sup> Al-Anṭākī writes that a savant from India (*ʿarīf min al-Hind*) told him that *anūsh dārū* was used there against ophthalmitis and fevers (*ḥakā lī ʿarīf min al-hind annahum yustashfawn bihī min al-ramad wa-al-ḥummayāt*).<sup>35</sup> The use of mercury pills is another indicator of interaction with Ayurvedic medicine, possibly mediated through Persian texts. Already in 1501, the Persian physician Bahā' al-Dawla describes an electuary of mercury (*maʿjūn-i sīmāb*) containing the liquid metal in his medical compendium *Khulāsat al-tajārib* (*The Essence of Experiments*).<sup>36</sup> In 1511, al-Yūsufi describes a recipe for a mercury pill (*ḥabb-i sīmāb*) which contains liquid mercury.<sup>37</sup> In 1569, ʿImād al-Dīn Maḥmūd b. Masʿūd b. Maḥmūd

30 Ibid., vol. 2, p. 125.

31 Ibid., vol. 1, p. 117. The detailed preparation and other aspects of using mercury internally against syphilis are discussed in my contribution "Healing with mercury: the uses of mercury in Arabic medical literature."

32 Anṭākī, *Tadhkira*, vol. 1, p. 184.

33 Ibid., vol. 2, pp. 48–49.

34 Ibid., vol. 1, p. 62; This remedy was already mentioned by Ibn Sīnā (see *Qānūn*, vol. 5: p. 2282).

35 Ibid., vol. 1, p. 62.

36 Bahā' al-Dawla, *Khulāsat al-tajārib*, p. 300; Elgood, "Translation of a Persian," p. 484; see Thomann, "Early Persian Medical," pp. 971–996.

37 Yūsufi, *Ṭibb-i Yūsufi*, p. 77.

al-Ṭabīb compiled a treatise on syphilis, the *Risālat-i ātishak* (*Treatise on Venereal Disease*).<sup>38</sup> He mentions several recipes for pills with mercury, or with mercury combined with sublimated mercury (*sulaymānī*), or with mercury combined with killed mercury. In contrast, mercury salve was typically used against syphilis in Europe in the sixteenth century. Mercury pills were introduced for that purpose in the middle of the sixteenth century but they were rarely used.<sup>39</sup>

Contacts with Europe can be also traced in the *Tadhkira*. Cinnabar (*zunjufr*) was imported from Venice (*jazā'ir al-Bunduqīyya*), Armenia and from the Indus valley (*huwa al-muta'āraf al-mutadāwal al-ān yujlab min nawāhī al-Sind wa-Armīniyā wa-jazā'ir al-Bunduqīyya*).<sup>40</sup> The sublimated mercury *sulaymānī* was also brought from the region of Venice (*a'māl al-Bunduqīyya*).<sup>41</sup>

Indigenous developments are very difficult to judge because the texts of physicians living between the fourteenth and sixteenth centuries have hardly been examined, not to mention the alchemical literature, which is still largely uninvestigated.

### Translations from Latin into Arabic

In the seventeenth century, a translation movement initiated by the imperial chief physician Ibn Sallūm al-Ḥalabi transmitted European iatrochemical knowledge into the Ottoman Empire. The arabophone Ibn Sallūm originated from Aleppo, where he studied and became head of the Aleppo hospital. After

38 Elgood "Translation of a Persian," pp. 476–478; 'Imād al-Dīn, *Risāla-i ātishak*, pp. 26–28.

39 The first mercury pills that came into use in Europe were the so-called *pillulae Barbarossae* (Lesky, "Quecksilber," p. 3183). Barbarossa or Khayr al-Dīn Pasha (1466–1546), the famous Turkish corsair and Grand Admiral of the Ottoman fleet, who assumed the role of an intermediary between Francis I and Süleymān, gave its recipe to the king of France who was syphilitic (on Khayr al-Dīn Pasha, see Galotta, "Khayr al-Dīn Pāshā," *EI*, 2. ed). Lesky suggests that it was composed of raw mercury, flour, and laxatives. Wherever the corsair obtained the recipe, it originated from the East, or otherwise the physician at the court of Francis I would have known it. Sudhoff analysed a variety of recipes applied to treat syphilis at the turn of the fifteenth to the sixteenth century that originated in Germany, France and Italy. Recipes of mercury salve are largely dominant (Sudhoff, *Frühgeschichte der Syphilis*, pp. 61–79).

40 Antākī, *Tadhkira*, vol. 1, p. 181.

41 Ibid., vol. 1, p. 198.

entering the retinue of the governor of Aleppo, Ibşir Muştafâ Pasha (d. 1655), he moved to Istanbul when the latter became Grand Vizier in 1654. Ibn Sallûm was appointed chief physician (*reʿîs ül-aṭibbâʿ*) at the hospital of Sultan Mehmed the Conqueror, and then became a physician of the palace (*aṭibbâʿ-ı sulṭânî*). He was finally promoted to the position of imperial chief physician (*ḥekîmbaşı* or *reʿîs ül-aṭibbâʿ*) in 1656 or 1660 and remained in this office until his death in 1669.<sup>42</sup> Ibn Sallûm's descendants held high positions in the elite of educated scholars (*ʿilmîye*), especially his son Yahyâ Efendî and grandson Feyzullâh Efendî, who held the position of *Rûmeli kâzîʿaskeri*.<sup>43</sup>

Ibn Sallûm was interested in the medical developments occurring in Europe. Therefore, he commissioned a Christian physician named Niqûlâwûs to translate some renowned compendia into Arabic.<sup>44</sup> This can be inferred from the preface and the closing part of the *Aqrabâdhîn Nîqûlâwûs* (*Antidotarium of Nicolas*) or *Tarjamat al-Aqrabâdhîn al-jadîd* (*Translation of the New Antidotarium*). According to Niqûlâwûs, the translation of this formulary was made at the request of Ibn Sallûm who commissioned the translation of Sennert's medical compendium as well.<sup>45</sup> We may conclude from this that Ibn Sallûm did not master Latin. Besides, we do not find in the bibliographic sources mentioning him any indicators on this subject.<sup>46</sup>

42 According to Ali Haydar Bayat, Ibn Sallûm was appointed chief physician of the Ottoman Empire (*ḥekîmbaşı* or *reʿîsul-aṭibbâʿ*) as the successor of Ḥammâlzâde Mehmed Efendî (d. 1656) in Shawwâl 1066/July 1656 (Bayat, *Osmanlı*, p. 69). However, Afyoncu claims that Ibn Sallûm was appointed only four years later, namely on 10 Dhû al-Hijja 1070/17 August 1660 (Afyoncu, *Osmanlılarda Sağlık*, vol. 1, pp. 29–30, 35, 36, 81).

43 Bachour, *Oswaldus*, pp. 35–44.

44 Ibid., pp. 72–75.

45 Ibid., pp. 73–75.

46 Ibid., pp. 36–43; 49–50. Miri Shefer indicates that Ibn Sallûm knew Latin because “he made several statements in his writings concerning this” (Shefer, “An Ottoman Physician,” p. 137). Presumably she means the citations in the preface of *al-Ṭibb al-kîmiyâʿi al-jadîd* in the first person narrative. Those phrases are verbatim translations from Sennert's *De chymicorum cum Aristotelicis et Galenicis consensu ac dissensu*, as a comparison with the Latin text revealed (see Bachour, *Oswaldus*, pp. 112, 115–120, 326–328; Sennert, *De Chymicorum*, pp. 1–35).

*Tarjamat al-Aqrabādīn al-jadīd* (Translation of the New Antidotarium)

This antidotarium was translated by Nīqūlāwūs into Arabic. However, it mainly circulated in its Ottoman Turkish version as *Terceme-i Akrabādīn-i cedīd or Aqrabādīn Süleymān Efendī* after the name of the Ottoman physician Süleyman Efendi (d. 1716) who translated it into Ottoman and supported Nīqūlāwūs' completing it since work on the book stagnated after Ibn Sallūm's death.<sup>47</sup> In the preface, Nīqūlāwūs narrates the story:

This book is the pharmacopoeia that is well regarded and widely used at this time, namely in the holy month of Ramadan, AH1092 [September/October 1681]. We began to complete this book at the request of one of the excellent and intelligent men, namely the chief physician in this great empire—may God elevate him forever—that is Šālīḥ Afandī b. Našr Allāh al-Ḥalabī [i. e. Ibn Sallūm; he said]: "I have a great desire for the book by Sennert, the German." It dealt with the treatment of all diseases.<sup>48</sup> Then I translated and abridged the book [titled] "The Chemical Medicine." Then I translated and completed this book to the seventh treatise. Then he [Ibn Sallūm] passed away [...] and it [the book] remained uncompleted for a while. Then we completed and terminated it with the physician named Sulaymān Afandī b. Ibrāhīm, one of the royal physicians ...<sup>49</sup>

The Arabic version differs partly in the sequence of the chapters and treatises from the Ottoman translation. It contains thirteen treatises: the first ten deal with conventional remedies (electuaries, antidotes, purgatives, powders, pills, troches, collyria, syrups, dressings), the eleventh with remedies for nobles, the twelfth with popular remedies and the thirteenth treatise with chemical remedies, i.e. remedies that are prepared by using alchemical procedures and apparatuses. It includes twelve chapters on aqua distillata (*muqattarāt*), spirits (*arwāḥ*), oils (*adhān*), elixirs (*iksīrāt*), tinctures (*ahwān*), mineral acids (*mīyāh ḥadda*), extracts (*khulāṣāt*), salts (*amlāḥ*), sublimates (*muṣa'adāt*), calcinates (*taklīsāt*), and magisteria (*masījrāt* [sic]).<sup>50</sup> Most of the remedies in the first ten treatises are attributed to a certain Nīqūlāwūs or Ibn Māsawayh, identifications that lead us to *Antidotarium Nicolai* and *Grabadīn Mesue*, the well-known

47 See Bachour, *Oswaldus*, p. 74.

48 Translation of Peter Pormann (Pormann, *Mirror*, p. 66).

49 See Bachour, *Oswaldus*, p. 75.

50 Ibn Sallūm, *Tarjama*: MS Bağdadlı Vehbi 1374, ff. 1<sup>v</sup>–55<sup>r</sup>.

pharmacopoeia of the European thirteenth century compiled by Nicolas of Salerno and Pseudo-Mesue, respectively.<sup>51</sup> However, the intertextuality of the Arabic text has not yet been sufficiently studied.<sup>52</sup>

*Al-Ṭibb al-kīmīyāʾī al-jadīd* (The New Chemical Medicine) and  
*al-Kīmīyāʾ al-malakīyya* (The Royal Chemistry)

*Al-Ṭibb al-kīmīyāʾī al-jadīd* has attracted the attention of many scholars of Islamic medical history, because it was thought to be a direct reception of Paracelsus, and therefore a testimony of Ibn Sallūm's Paracelsism.<sup>53</sup> In fact, the *New Chemical Medicine* combines translated sections from several Latin medical and pharmaceutical books, namely Daniel Sennert's *Medical Institutions* (*Institutionum medicinae*), *On the Agreement and Disagreement of the Chemical Authors with the Aristotelians and Galenists* (*De chymicorum cum Aristotelicis et Galenicis consensu ac dissensu*); Oswaldus Crollius's *Treatise of Signatures* (*De signaturis internis rerum*) and Wecker's *Special Pharmacopoeia* (*Antidotarium speciale*). In the extant manuscripts, *al-Ṭibb al-kīmīyāʾī al-jadīd* is inevitably followed by *al-Kīmīyāʾ al-malakīyya*—the Arabic translation of Oswaldus Crollius's iatrochemical textbook *The Royal Chemistry* (*Basilica chymica*). These two texts were transmitted together as a unit and were both translated into Ottoman Turkish and Persian.<sup>54</sup>

*Al-Ṭibb al-kīmīyāʾī al-jadīd* is composed of four treatises.<sup>55</sup> In the preface, the translator gives a short definition of spagyric as the science of separation and aggregation, outlines its history, and legitimises it by describing the changing attitudes towards it after its evolution from mere alchemy (whose sole object was allegedly the transmutation of metal into gold) to a practice seeking to syn-

51 See Schmitz, *Geschichte*, vol. 1, pp. 377, 378, 383.

52 The author is currently researching this topic.

53 For a detailed explanation see Bachour, *Oswaldus*, pp. 107–113.

54 See *ibid.*, pp. 144–151. Other evidence of the unity of *al-Ṭibb al-kīmīyāʾī al-jadīd* and *al-Kīmīyāʾ al-malakīyya* is the complementary structure, evidenced by anaphoric text references in *al-Kīmīyāʾ al-malakīyya* as well as by the omission there of recipes already mentioned in *al-Ṭibb al-kīmīyāʾī al-jadīd*. A further error that was circulated in terms of the text history was the notion that *al-Ṭibb al-kīmīyāʾī al-jadīd* was a part of Ibn Sallūm's encyclopaedic work *Ghāyat al-itqān fī tadbīr badan al-insān* (see Bachour, *Oswaldus*, pp. 87–90).

55 The following description of the composition of *al-Ṭibb al-kīmīyāʾī al-jadīd* is taken from Bachour, *Oswaldus*, pp. 115–133.

thesise cures in order to heal disease and preserve health. The first treatise is on natural philosophy or the theoretical principles of spagyric. The ten chapters contain explanations of the first matter (*materia prima*), elements, forms and species, animation, vital heat and spirit, the dogma of the three principles (i.e. salt, sulphur and mercury, the *tria principia*), generation and temperament, species generated from other species, transmutation (changing an external form but keeping its species-specific form), and the analogy between macrocosm and microcosm.

The second treatise deals with the principles of chemical medicine (*ṭibb kīmiyāʿī*). The treatise gives explanations of the faculties of the human body, the pathology of diseases according to the doctrine of the three principles (*tria principia*) of salt, sulphur and mercury, and the Paracelsian concept of tartaric pathology.<sup>56</sup> It outlines the semiotic of pulse and urine and gives an explanation of the cycles of diseases and fevers. It outlines the effects of the universal medicine, and lists sympathetic groups of drugs according to their signatures, i.e. their external characters, which symbolise their effects. The third treatise explains chemical operations in general. We find practical instruction in the preparation of medicaments, including on the degrees of heat, trituration, dissolution, calcination, corrosion, putrefaction, fermentation, maceration, decoction, collation, distillation, sublimation, coagulation, preservation and thickening. The fourth treatise, on the chemical operations of specific simples, contains two parts. The first deals with distillation methods for waters and spirits, the second with oils. Both parts open with general instructions on distillation, followed by specific distillation methods for plants, animals and minerals.

The four-treatise structure of *al-Ṭibb al-kīmiyāʿī al-jadīd* represents the organisation of the older manuscript tradition to which this book belongs. Later manuscripts of the same work are subdivided into six treatises. The first treatise deals with natural philosophy, the second with the principles of chemical medicine, the third with the doctrine of signatures, the fourth with general chemical operations, the fifth with distillation methods for spirits, and the sixth with distillation methods for oils. This transmission line differs from its antecedent only in this restructuring, with no differences in the content or sequence of treatises and chapters.<sup>57</sup>

56 The concept that diseases are caused by coagulations of excremental salts as a result of external factors, just as tartar (a product of fermentation) precipitates in wine casks in storage (see Pagel, *Paracelsus*, pp. 153–156).

57 Bachour, *Oswaldus*, pp. 121–122.

Thus *al-Ṭibb al-kīmīyāʾī al-jadīd* explains the theoretical principles, chemical operations in general, and instructions for the distillation of simples to prepare spirits and oils. However, it contains no recipes for the preparation of compound medicines. This gap was filled by *al-Kīmīyāʾ al-malakīya*, which mainly contains prescriptions for compound remedies. *Al-Kīmīyāʾ al-malakīya* contains two treatises. The first treatise contains eight chapters on general cures, including digestives, emetics, cathartics, diuretics, diaphoretics, confor-tativa, analgesics and hypnotics, as well as odorifera. The second treatise is on *specifica*, or remedies for specific diseases. The sequence of the categories of *specifica* are altered to match the classical order used in the Arabic medical compendia, with diseases listed according to the organs affected (from top to toe), with non-organ-specific diseases discussed last. Each category contains the preparation method for one or several remedies, including chemical operations.<sup>58</sup>

*Al-Ṭibb al-kīmīyāʾī al-jadīd* and *al-Kīmīyāʾ al-malakīya* were translated twice into Ottoman Turkish, the first complete Ottoman translation being *Ġāyet ül-münā fi tedbīr il-marzā* (*Utmost Desire in the Treatment of Patients*) by the physician Ḥasan Efendi and the second translation being *Mürşid ül-elibbā fi tercemet ispağiryā* (*Guide of Wise Men: the Translation of Spagyric*) by the Ottoman Chief Physician Gevrekzāde Ḥāfiz Ḥasan (1727–1801). An anonymous abridgment of the first translation was circulated under the title *Ġāyet ül-müterakķī fi tedbīr il-marzā* (*Utmost Goal in the Treatment of Patients*). Apart from the complete translations of *al-Ṭibb al-kīmīyāʾī al-jadīd* and *al-Kīmīyāʾ al-malakīya*, the first and second treatises of *The New Chemical Chemistry* (on natural philosophy and on the principles of the New Medicine, respectively) were also translated and integrated into medical compendia written in Ottoman Turkish. ‘Ömer b. Sinān el-İznīkī (b. 1704?) integrated the two theoretical treatises into his compendium *Şifāʾ ül-müʾminīn* (*Healing of the Believers*). ‘Ömer Şifāʾī el-Burūsavī (d. 1742) integrates the preface, the first treatise, and the first six chapters of the second treatise into his book *Kitāb uṭ-ṭibb il-cedīd il-kīmīyāʾī* (*New Chemical Medicine*).<sup>59</sup>

58 Ibid., pp. 155–159, 206–224.

59 For more details on the translation into Ottoman see Bachour, *Oswaldus*, pp. 363–373.



### *Ghāyat al-itqān fī tadbīr badan al-insān* (Utmost Perfection in the Treatment of the Human Body)

The most extensive medical work attributed to Ibn Sallūm is *Ghāyat al-itqān fī tadbīr badan al-insān*, which was completed posthumously. Yahyā Efendī, the son of Ibn Sallūm, charged Aḥmad Abū al-Is‘ād with putting the manuscripts of Ibn Sallūm into order, as the latter died before he could accomplish the compilation of this work.<sup>60</sup> *Ghāyat al-itqān* was translated into Ottoman Turkish by Ebū l-Feyḏ Muṣṭafā Efendi (d. 1747), under the title *Nüzhet ül-ebdān fī tercemet Ghāyat al-itqān* (*Promenade of the Body in the Translation of the Utmost of Perfection*) in 1728. Interestingly, Ibn Sallūm’s grandson, Feyḏullāh Muṣṭafā, had commissioned the translation.<sup>61</sup>

*Ghāyat al-itqān* is divided into four treatises (*maqāla*).<sup>62</sup> The first is on general pharmacognosy, and contains three parts (*juz’*). The first is dedicated to the general principles of drug composition, to natural simples, and to artificial remedies. The second part deals with pharmacological aspects and contains categories of drugs according to their faculties or according to the humours of the body. The third part deals with the chemical preparation methods of remedies in general, such as calcification, distillation, precipitation, and solvation. The texts were translated from the fifth book of Sennert’s *Medical Institutions* and from Johann Jacob Wecker’s (1528–1586) *General Pharmacopoeia* (*Antidotarium Generale*).

The second treatise is a formulary (*aqrābādhīn*) containing two parts: the first deals with internal remedies (such as syrups, distillations etc.) and the second with external remedies (oils, salves, plasters etc.). The chapters are based on Wecker’s *Special Pharmacopoeia*, books two and three. The third and fourth treatises are on pathology. The third treatise deals with organ-specific diseases, arranged after the classical principle from top to toe. It is based on Sennert’s *Medical Practice* (*Practica medicina*) (the first four books) and *Treatise of Arthritis* (*De arthritide tractatus*). The fourth deals with non-organ-specific diseases: fevers, tumours, aesthetic modelling diseases (*amrāḍ al-zīna*) and intoxication. It is based on Sennert’s *Medical Practice* (books five and six) and *Book on Fever* (*De febribus*).

For the sake of completeness, two further treatises must be mentioned. These were copied as an appendix to *Ghāyat al-itqān*. The first is *Risāla fī bayān*

60 Ibn Sallūm, *Ghāyat al-itqān*, MS Ayasofya 3682, ff. XIV<sup>v</sup>–I<sup>r</sup>.

61 Bachour, *Oswaldus*, p. 364.

62 More details on the structure and intertextuality of the treatises and chapters are presented in Bachour, *Oswaldus*, pp. 93–106.

*isqūrbūṭ* (*Treatise on Scurvy*), an abridgement of Sennert's *Treatise on Scurvey* (*De scorbuto tractatus*). Here several chemical substances were recommended, such as spirit of vitriol (*rūḥ al-zāj*), tartareous vitriol (*ṭarṭarū wīṭrīyūlātū*), cream of tartar (*qrīmū ṭarṭūr*), spirit of salt (*rūḥ al-milḥ*) and diaphoretic antimony (*antīmūn mu'arriq*).<sup>63</sup> The second treatise is *Tarjamat risāla fī al-ḥum-mayāt al-radī'a wa-al-wabā'yya* (*Translation of a Treatise on Malicious and Epidemic Fevers*), an adaptation of the book by the Spanish physician Luís Mercado (1520–1606), *De febre pestilenti et de maligna ac de accidentibus, quae iis et reliquis putridis succrescunt*. This treatise contains no chemical remedies.<sup>64</sup> In addition to these books and treatises, several texts were wrongly attributed to Ibn Sallūm due to mistakes in the cataloguing of some manuscripts.<sup>65</sup>

### The Translation Procedure

The compilation method for the translated medical compendia attributed to Ibn Sallūm resembles a cut-and-paste procedure.<sup>66</sup> The translator first selected sections from several Latin compendia. The main criterion for the selection was pragmatic. For example, in *De chymicorum cum Aristotelicis et Galenicis consensu ac dissensu*, chapters dealing with the history of alchemy, Paracelsus's biography, magic and occultism, with atomism and with the conflict between the Galenists and the followers of Paracelsus were omitted.<sup>67</sup> The translated segments were then combined into a complementary book that followed the classical organisation pattern of Arabic medical compendia, although the sequence of the chapters and sections might differ from the original text, or single recipes be integrated. In *Ghāyat al-Itqān*, some paragraphs were occasionally added that were not taken from Latin works: these included some remedies or commentaries of al-Anṭākī and five recipes of Ibn Sallūm.

The translation process shows three characteristics, as revealed by a comparison of the complete text of *al-Kīmiyā' al-malakīya* with the source text of the *Basilica Chymica*: first the condensation of the text, then a practical orientation, and finally, an assimilation with the target culture.<sup>68</sup> The text is condensed by omitting digressions and alternatives, and by streamlining the text so as to

63 Ibid., pp. 82–85.

64 Ibid., pp. 85–87.

65 Ibid., pp. 134–137.

66 See *ibid.*, pp. 107–134, 151–224.

67 See *ibid.*, pp. 168–176.

68 For more details see Bachour, *Oswaldus*, pp. 225–266.

produce a clear manual of instruction for the preparation of chemical cures. With regard to the second aspect, the translator integrates his own expertise as an experienced alchemist into the Arabic text, adding, omitting or occasionally altering some specifications as to instruments, materials and time. The assimilation of the printed Latin texts with the customs of Ottoman manuscript culture was achieved by the elimination of structural markers such as numerations or headlines. The restructuring of the text according to the traditional pattern from top to toe also represents an assimilation.

### Paracelsism in the Ottoman Empire?

In the sixteenth century, Paracelsus called for a new medicine (*nova medicina*). He broke with the orthodox medical doctrine, based on humoral pathology, because he was convinced that the healer should observe and learn from nature, rather than study ancient texts. His doctrine comprised diverse alchemical, astrological and magical conceptions that were in part ambivalent and even contradictory. On the one hand, Paracelsus considered illness to be a specific entity requiring a specific cure for its elimination; on the other, he postulated the theory of the three principles (salt, sulphur and mercury), in correlation with the three states of matter (solid, fluid and volatile)—as experienced by the alchemist in his laboratory. Salt, sulphur and mercury were thought to represent the immaterial principles of solidity, inflammability and volatility, respectively. Diseases were to be cured by remedies according to these principles. Paracelsus also used alchemical remedies in his therapy, including mercury and antimony derivatives applied internally, a practice unacceptable to Galenists.<sup>69</sup>

Some translated Latin texts contained Paracelsian ideas, especially the *Royal Chemistry* of the Paracelsist Oswaldus Crollius, or the eclectic work by Daniel Sennert, *On the Agreement and Disagreement of the Chemical Authors with the Aristotelians and Galenists*. This section summarises the mechanisms of translating Paracelsian ideas in *al-Ṭibb al-kīmīyāʾ al-jadīd* and *al-Kīmīyāʾ al-malakīyya* according to the four aspects of transmission of medical, alchemical, astro-magical and religious concepts.

The concepts of the Paracelsian *new medicine* were assimilated. On the one hand, the translation is selective, with natural-magical, astrological, Christian

69 See on this Friedrich/Müller-Jahncke, *Geschichte*, pp. 280–285; Porter, *Greatest*, pp. 202–205.

and mystical elements being ignored along with other elements deviating from humoral pathology, such as the refutation of the doctrine of qualities and degrees, or the debate on the principles of therapy (“the opposite is cured with the opposite” or “like cures like”). On the other hand, the translator has integrated the text into the field of humoral pathology by adding Galenic terms, or by substituting some Paracelsian terms with Galenic terms. Medical terms appear in the Arabic text, such as temperament (*mizāj*), the six non-naturals (*asbāb sitta ḍarūriyya*), humour (*khilṭ*), temperate (*ta’dil al-mizāj*), or balanced temperament (*mizāj mu’tadil*). Although the first theoretical treatise of *al-Ṭibb al-kīmīyā’i al-jadīd* contains some Paracelsian concepts, such as the dualistic character of the elements, the *three principles* and tartaric pathology, these concepts have been assimilated in such a way that no obvious contradiction to Graeco-Arabic medicine remains. The translator’s reserve in reporting these concepts demonstrates that *al-Ṭibb al-kīmīyā’i al-jadīd* does not represent a transmission of Paracelsism as understood in Europe, as an antithesis to humoral pathology.<sup>70</sup>

In the same way, the Paracelsian spagyric was demystified and represented purely as the art of preparing remedies by means of alchemical procedures. The Paracelsian term *arcanum*, which describes the subtle, hidden true medicine that is captured in crude shells and that must be freed by alchemical procedures, is simply translated as ‘cure’ (*dawā*).<sup>71</sup> Nevertheless, the remedies of Paracelsus are highly praised in two passages that were added by the translator. The first praised remedy is diaphoretic antimony with gold, prepared by distilling sublimated mercury with antimony and adding the distillate to a gold solution of aqua regia. The precipitated product is finally broiled and used as a diaphoretic against a wide range of diseases. The translator writes: “Many people were treated with various remedies but have not been cured. When they took this blessed remedy they were relieved of their malignant diseases.”<sup>72</sup> With the same enthusiasm, the translator praises the analgesic and hypnotic remedies of Paracelsus, which contain extractions of opium, henbane (*banj*) and mandragora (*lufāḥ*): “The Galenists (*aṭibbā’ Jalīnūs*) apply the hypnotic narcotics (*mukhaddirāt munawwima*) but they [narcotics] remain toxic because they [Galenists] do not know how to separate their toxicity. We use these drugs as well but after preparation (*tadbīr*) and separation of the toxicity (*tafrīq al-summiyya*).”<sup>73</sup>

70 For more details see Bachour, *Oswaldus*, pp. 270–319.

71 Ibid., p. 321; for more details see *ibid.*, pp. 319–329.

72 Ibn Sallūm, *al-Kīmīyā’*: MS Ayasofia 3671, f. 40 r.

73 Ibid., f. 42 v.

The assimilation of Paracelsian astro-magical concepts is also very clear. For instance, the term *astrum* (the invisible part present in all creatures that corresponds with the astral sphere and connects all astral bodies and terrestrial creations through sympathy and antipathy) is ignored in the translation, even though it represents the basis of natural magic. Nevertheless, some astro-magical concepts are integrated by use of the concept of occult properties (*khāṣṣa*) to explain the effect of the weapon salve (*marham armāriyā*), a remedy which was applied to the weapon that had caused a wound and which was supposed to heal the injury it had made. However, the active ingredient of the salve was inaccurately translated or copied, namely “usnea”—the lichen that grows on the skull of a dead body hanged in open air and exposed to the light of the moon and other celestial bodies. The remedy contains, in the Arabic translation, “skull bones of a human” (*‘aẓm qaḥf al-insān*).<sup>74</sup> Furthermore, the correspondence between macrocosm and microcosm is represented merely as a relation of static analogy, and the doctrine of signature is reduced to the indication of sympathetic groups or drugs related (*mansūba*) to a certain organ or disease. This affinity is explained by the occult properties of the drugs and considered to be a gift of God.<sup>75</sup> Additionally, the translator omits three remedies of the *Basilica Chymica* which are based on the magical concepts of antipathy and sympathy: two amulets that preserve from infection in the plague, “Xenexton of Paracelsus” (*Zenexton Paracelsi*) and “Xenexton for wealthy people” (*Zenexton pro ditioribus*), and the “Powder of horse-warts” (*Pulvis ex callis equorum*), which contains the warts of horses and was thought to be effective against convulsion of the hypochondrium or hysteria.

Finally, the translation of *The Royal Chemistry* omits all Christian elements, while adding some Islamic elements so that the integration of *al-Kīmiyā’ al-malakīyya* into Islamic scholarly culture is facilitated. Nevertheless, problematic substances from the point of view of religious law, such as wine or lard, are not systematically omitted.<sup>76</sup> What was omitted, however, was the preparation of the human mummy (*mumia hominis*), religiously prohibited by *fatwās*.<sup>77</sup> The extract of this drug was the main ingredient of the theriac of *mumia homi-*

74 Compare Ibn Sallūm, *al-Kīmiyā’*: MS Ayasofia 3671, f. 52<sup>r</sup>. with Crollius, *Basilica*, p. 243; see Bachour, *Oswaldus*, p. 339.

75 For more details see *ibid.*, pp. 329–359.

76 *Ibid.*, pp. 359–362.

77 Two *fatāwa* of Ebüssu’ūd Efendi (d. 1574) deal with human mummy. The first prohibits the medical use of the mummy of a person even if he has left a testimony approving this use for the benefit of Muslims, and the second prohibits the sale of mummified human flesh. See Düzdağ (ed.), *Şeyhülislām Ebussuud Efendi fetvaları*, p. 181.

nis. In al-*Kīmiyā' al-malakīyya*, the theriac of *mumia hominis* was translated into Arabic, and many remedies for internal application contain this ingredient. Purchase lists of the royal palace prove that *mumia hominis* was indeed used in practice.<sup>78</sup>

### Ibn Sallūm al-Ḥalabī and the Ottomanisation of Iatrochemistry

Although several medical compendia were attributed to Ibn Sallūm, the only work written by him is *Ġāyet ül-beyān fī tedbīr beden il-insān* (*Utmost Explanation in the Treatment of the Human Body*). This work was written in Ottoman Turkish and completed in 1664. As indicated in the preface, Ibn Sallūm compiled it at the demand of Sultan Mehmed IV (r. 1648–1687). He selected new rules, therapies, and preparations from renowned works that had not been mentioned by the ancients (*selef*).<sup>79</sup>

*Ġāyet ül-beyān* comprises four treatises. The first deals with the principles of regimen and diet, of bathing, cupping and bloodletting; the second is a pharmacopoeia, dealing in the first part with simple drugs and in the second with compound remedies arranged in ten chapters: syrups (*şerbetler*), electuaries and stomachics (*ma'cunlar ve cevereşler*), purgative electuaries (*müşhil olan ma'cunlar ve cevereşler*), pills (*hıblar*), troches (*kırşlar*), powders (*sefuf*), confections (*la'ûk*), salves (*merhemler*), oils (*yâğlar*) and collyria (*şiyâflar*); the third deals with pathology, covering organ diseases from top to toe; and the fourth treatise deals with non-organ-specific diseases, i.e. fevers, tumours, aesthetic modelling diseases (*emrâz ul-zîne*) and intoxication. The compendium ends with a chapter on 'tested remedies' (*müjrerbât*), or remedies that act through their occult properties (*virtutes*).<sup>80</sup>

*Ġāyet ül-beyān* was translated twice into Arabic, by Muḥammad al-Rayyis al-Ghazzī (d. 1718) and by Muḥammad b. Sharīf al-Ḥalabī in 1843.<sup>81</sup> Recently, an edition of this work was published by Muḥammad Yāsir Zakkūr, who used both translations for his edition. However, the translators must have been

78 See my forthcoming contribution "Mūmiyā als Arznei im arabischen und osmanischen Schrifttum."

79 Ibn Sallūm, *Ġāyet ül-beyān*: MS Köprülü 1/975, ff. 5<sup>r</sup>–5<sup>v</sup>; see Bachour, *Oswaldus*, pp. 66–71.

80 Ibn Sallūm, *Ġāyet ül-beyān*: MS Köprülü 1/975, ff. 7<sup>v</sup>–43<sup>v</sup> (first treatise); ff. 43<sup>v</sup>–126<sup>v</sup> (second treatise); ff. 126<sup>v</sup>–260<sup>r</sup> (third treatise); ff. 260<sup>r</sup>–298<sup>v</sup> (fourth treatise); ff. 298<sup>v</sup>–300<sup>v</sup> (epilogue).

81 Ibn Sallūm, *Ghāyat al-Bayān* (Arab.), p. 16.

consulting the Arabic compendium *Ghāyat al-itqān fī tadbīr badan al-insān* since they adjoined passages that are not mentioned in the Ottoman compendium *Ġāyet ül-beyān* to their translated texts. A comparison of the chapter on syphilis (*dā' ifranjī*) in the Arabic edition of Zakkūr with the Ottoman original reveals that Ibn Sallūm's caution on using mercury was omitted and that some recipes containing mercury were added.<sup>82</sup> All of them were taken from *Ghāyat al-itqān fī tadbīr badan al-insān*.<sup>83</sup> The translator even added remarks in the first-person narrative pointing to the Arabic compendium *Ghāyat al-itqān*.<sup>84</sup>

Considering the intertextuality of the Ottoman-Turkish *Ġāyet ül-beyān*, Ibn Sallūm must have used the translated works from Latin to compile this compendium. He used the pathological treatises of *Ghāyat al-itqān* to compile the corresponding chapters in *Ġāyet ül-beyān*. Nevertheless, Ibn Sallūm does not merely reproduce the translated chapters; rather, he selects, adds some comments indicating his opinion on the aetiology of some diseases, on their incidence in Istanbul or narrating some anecdotes from his medical practice. However, the quotation of the Greek authorities such as Hippocrates (*Būkrāṭ*) and Galen (*Cālīnūs*) and of the classical Arabic authorities such as Ibn Sīnā and al-Rāzī are taken from *Ghāyat al-itqān* and subsequently they represent quotations at second hand, via the eclecticist Sennert who quotes Greek and Arabic, as well as European, authorities. Although Ibn Sallūm adds passages taken from Ottoman medical works, namely from al-Anṭākī,<sup>85</sup> from Ibn Şerif 'Alī Çelebi (fl. 15th c.),<sup>86</sup> and from Hacı Paşa Celāleddīn el-Aydinī (d. 1417). From Hacı Paşa's

82 Compare the Ottoman version of *Ġāyet ül-beyān fī tedbīr beden el-insān* (Ibn Sallūm, *Ġāyet ül-beyān*: MS Köprülü 1/975: ff. 281<sup>v</sup>, 13–283<sup>v</sup>) with the edited Arabic translation (Ibn Sallūm, *Ghāyat al-Bayān* (Arab.), pp. 868–875).

83 Compare the edited Arabic translation (Ibn Sallūm, *Ghāyat al-Bayān* (Arab.), pp. 868–875) with the chapter on syphilis in *Ghāyat al-Itqān fī tadbīr badan al-insān* (Ibn Sallūm, *Ghāyat al-Itqān*, MS Ayasofya 3682, ff. 281<sup>v</sup>, 18–284<sup>v</sup>, 16).

84 Four chapters contain such remarks: the chapter on sterility (*uqr*) ends with the sentence *wa-tamāmuhū mā 'allaqnāhu fī kitābinā Ghāyat al-itqān* (a complete [description] is written in our book *Ghāyat al-itqān*); the chapter on putrid fever (*humma 'afanīyya*) ends with the words: *wa-tamām 'ilāj hādhihi al-humma mā dhakarnāhu fī kitābinā Ghāyat al-itqān* (the complete [description] of the treatment of this fever is mentioned in our book *Ghāyat al-itqān*); similar indications are found in the chapter on phlegmatic tumors (*waram filaghmūnī*) and on leprosy (*judhām*) (Ibn Sallūm, *Ghāyat al-bayān* (Arab.), pp. 737, 768, 841, 868 resp.).

85 Al-Anṭākī is quoted in the chapters on syncope (*ghashī*), on intestine diseases (*emrāz ul-am'ā'*) (Ibn Sallūm, *Ġāyet ül-beyān*: MS Köprülü 1/975: ff. 185<sup>r</sup>, 203<sup>v</sup>).

86 Ibn Şerif's medical compendium is *Yādigār fī al-ṭibb* (*Souvenir of Medicine*) that was

medical encyclopaedia *Shifā' al-asqām wa dawā' al-ālām* (*The Healing of Body and the Cures of Achiness*), Ibn Sallūm adds a chapter on a disease called the collapse of the navel (*göpeğin düşmesi*) that was not mentioned by the ancestors (*al-mutaqaddimūn*).<sup>87</sup>

Regarding the pharmaceutical parts of *Ġāyet ül-beyān*, the *aqrābādhīn* of the second treatise is based largely on *Tarjamat al-Aqrābādhīn al-jadīd*. But, Ibn Sallūm experiments with the remedies before recommending them.<sup>88</sup> The section on simples covers new herbs that were recently imported from the New World, or were not mentioned in the books of the ancients (*al-mutaqaddimūn*). The original texts might be taken from Wecker's *Special Pharmacopoeia* or Sennert's *Medical Institutions*. Ibn Sallūm used *Ikhtiyārat al-badī'ī fī al-adwīya al-mufrada wa-al-murakkaba* (*Marvelous Selections of Simple and Compound Drugs*) by the Persian physician 'Alī b. Ḥusayn al-Anṣārī, called Ḥājī Zayn al-'Atṭār (d. 1403), as indicated in the chapter on *Nūrūz otī* (herb of Nowruz).<sup>89</sup> In the section on simples, many drugs were praised with quotations of the Prophet Muḥammad, a gesture of erudition and piety.<sup>90</sup> The epilogue comprises remedies with occult properties (*khāṣṣa*).<sup>91</sup>

Thus, *Ġāyet ül-beyān fī tedbīr beden il-insān* is an eclectic work. It adopts elements of Arabic prophetic medicine and literature on tested drugs, as well as Arabic, Ottoman and Latin medical literature of the medieval and early modern periods. The quoted authorities comprise a wide range, beginning with the Prophet Muḥammad, and including the Ottoman physicians al-Anṭākī, Hacı Paşa, Ibn Şerif, the Persian Zayn al-'Atṭār, Pseudo-Mesue (Māsawayh) and Nicholas of Salerno (Niqūlāwus), the eclectic Sennert (Sanārtūs), and the "chemical doctors" (*ḥukemā'-ı kīmyāvīler*), who were consistently quoted as

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frequently copied (see İhsanoğlu, *Osmanlı Tıbbi*, vol. 1, pp. 78–83). Ibn Şerif is cited in the chapter on ileus (*ilāwus*), for example (see Ibn Sallūm, *Ġāyet ül-beyān*: MS Köprülü 1/975, ff. 185<sup>r</sup>, 212<sup>r</sup>), but he is not mentioned in *Ghāyat al-Itqān*.

87 Ibn Sallūm, *Ġāyet ül beyān*: MS Köprülü 1/975, f. 206<sup>v</sup>. The disease is caused by wind and water that are detained in the region around the umbilicus. The symptoms are pain and colic. This chapter is not mentioned in *Ghāyat al-Itqān*.

88 Ibid., f. 106<sup>r</sup>: *mürekkebatdan mücerreb olanları bu babda irād eyledik* (In this section we mention the compound medicines that have been tested).

89 Ibid., f. 100<sup>v</sup>. I owe the identification of this work to Muḥammad Yāsir Zakkūr (see Ibn Sallūm, *Ghāyat al-bayān*, p. 271, footnote 3).

90 For example on narcissus (*nercis*), senna (*senā*), milk (*sūd*), thyme (*şa'tar*) etc. (See Ibn Sallūm, *Ġāyet ül beyān*, MS Köprülü 1/975, ff. 70<sup>r</sup>, 70<sup>v</sup>, 72<sup>v</sup>, 76<sup>r</sup> resp.) It is worth mentioning that not all paragraphs about simples contain sayings of the Prophet.

91 Ibid., ff. 299<sup>r</sup>–300<sup>v</sup>.



a group. Additionally, *Ġāyet ül-beyān* contains remedies, accounts and comments by Ibn Sallūm himself.<sup>92</sup>

*Ġāyet ül-beyān* gives the historian of medicine a very clear picture of the medical philosophy and practices followed by an Ottoman chief physician in the second half of the seventeenth century. Humoural pathology remains the framework of aetiology and therapy. Health is considered to be a state of balance between the four humours of the human body: blood, phlegm, yellow bile and black bile. Each of these is associated with two of the four primary qualities: hot, cold, dry and moist. Illness was thus an imbalance between the qualities or the humours of the body; it was to be removed by eliminating the excess of one humour by bloodletting or purging, or by giving a medicine that possessed its contrary quality. Nevertheless, Ibn Sallūm integrates chemical preparations, which he has tested himself, into this framework; he labels these as *bizim mücerrebātımızdır* (among our tested preparations) or *mücerrebdir* (tested).<sup>93</sup>

### Chemical Preparations Used in Istanbul

Although Ibn Sallūm mentions several chemical remedies in *Ġāyet ül-beyān* and describes their effects and indications, he does not explain their preparation.<sup>94</sup> In addition, the sections on compound drugs contain no chemical remedies. This gap was filled by *Tarjamat al-Aqrābādhūn al-jadīd*, which contains a treatise on chemiatic preparations and by *al-Tibb al-kīmīyāʾī al-jadīd*. These two texts must have played a crucial role in the transmission of iatrochemical knowledge, because they explain the chemical operations and provide recipes for preparing mineral drugs. Ottoman doctors and alchemists were able to manufacture iatrochemical derivatives themselves, rather than having to buy them from the 'Franks.' In his medical compendium *Ġāyet ül-beyān fī tedbīr beden il-insān*, Ibn Sallūm writes on salt of prunella: "The Franks bring it to Istanbul and sell it. Now they [the Franks] synthesise it in Istanbul, and we also synthesise it."<sup>95</sup>

92 On Ibn Sallūm's own remedies see Bachour, *Oswaldus*, pp. 66–71.

93 Bachour, *Oswaldus*, pp. 50–60. A discussion of chemical preparations used by Ibn Sallūm follows.

94 Ibn Sallūm mentions several distilled spirits and oils by their names, he even mentions that they are distilled with cucurbita and alembic. These notes do not prove that he practiced alchemy (for examples see below).

95 Ibn Sallūm, *Ġāyet ül-beyān*, ms Köprülü 1/975, ff. 136<sup>v</sup>–137<sup>r</sup>.

Ibn Sallūm describes in *Ġāyet ül-beyān* further preparations and herbal plants that were sold in Istanbul by the Franks. The spirit of vitriol (*rūḥ al-zāj*) was distilled by the Franks and brought to Istanbul to be sold.<sup>96</sup> Galata seems to have played an important role in the trade of medical materials. Ibn Sallūm mentions that wax pessaries (*bal mumundan fitil*), angelica (*ancelikā*) and masterwort (*amberātūryā*) were brought from western Europe (Frengistān) and sold in Galata.<sup>97</sup>

What are the chemical preparations that the Ottoman physicians or druggists could synthesise following the instructions of the translated texts? Table 1 gives an overview of these chemical derivatives, arranged in chemical classes. The most important preparations are the antimony and mercury derivatives, which were indicated against a wide range of illnesses. Their use aroused a heavy debate between Galenists and Paracelsists in Europe, and served as an identifier of Paracelsists. Ibn Sallūm must have had his own reservations about the internal application of these remedies. He rarely mentions them in *Ġāyet ül-beyān*, and when he does so, it is without the laudatory epithets he uses when recommending the chemical remedies of the iatrochemists (*ḥukemāʾ-i kimyāviler*). In the chapter on syphilis, he refers to the therapy with mercury (*cīve*) by taking it internally as pills (*ḥabb*) or by applying it externally as a salve (*ṭilā*), but he warns of the risks (*muḥāṭara*). Consequently, these mercury preparations are to be applied under the supervision of a physician, and he will not give any further details.<sup>98</sup> Ibn Sallūm mentions also that the Franks apply the glass of antimony (*antimūnuñ şıçası*) and saffron of antimony (*zaferān-ı maʿdenī*) for quartan intermittent fever (*ḥummā-yı rübʿ-i dāʿire*). Nevertheless, he warns that not everybody would tolerate the glass of antimony and hence that it is to be applied only to persons of strong constitution.<sup>99</sup> We conclude from this that Ibn Sallūm was not categorically against the internal application of antimony and mercury derivatives. He was, however, cautious with regard to its dangers.

The entries in the table show the wide variety of iatrochemical remedies introduced to the Ottoman Empire. But were these preparations merely pres-

96 Ibid., ff. 130<sup>v</sup>.

97 Ibid., ff. 238<sup>r</sup>, 251<sup>v</sup>.

98 "But since this cure is dangerous and in need of a physician, we did not consider it" (*lākin bu ʿilāc muḥāṭaralı olmağla ṭabibe muhtācdur böyle oldığından biz terk eyleyüb yazmadık*). Ibn Sallūm, *Ġāyet ül-beyān*, MS Köprülü 1/975, f. 285<sup>v</sup>.

99 "But since not everybody can tolerate it, it is to be applied only to persons of strong constitution and it should not be given to weak persons." (*lākin buña herkes taḥammül eylemez mizācı kavī ādamlara vereler zaʿiflere vermeyeler*). Ibid., ff. 268<sup>v</sup>–269<sup>r</sup>.

TABLE 1 *Inorganic iatrochemical substances described in translated works*

<b>Antimony derivatives</b>			
<b>Latin names</b>	<b>English names</b>	<b>Arabic names</b>	
Mercurius vitae/ Flores butyri antimonii	Mercury of live	<i>zī'baq al-ḥayāt</i>	KM, 35f, 12
Vitrum antimonii	Glass of antimony	<i>zujāj al-antīmūn</i>	KM, 36f, 1
Flores antimonii	Flowers of antimony	<i>antīmūn muṣa'ad</i>	KM, 35v, 9
Antimonium diaphoreticum	Diaphoretic antimony	<i>antīmūn mu'arriq sādḥaj</i>	KM, 40f, 4
Antimonium diaphoreticum cum auro	Diaphoretic antimony with gold	<i>antīmūn dīyāfūritikūn</i>	KM, 40f, 4
<b>Mercury derivatives</b>			
Arcanum corallinum Paracelsi / Mercurius sublimatus rubeus non corrosivus	Red sublimated mercury	<i>zī'baq marjānī ḥulw</i>	KM, 34v, 19
Turpetum minerale	Mineral turpeth	<i>tarbadh ma'danī</i>	KM, 34f, 2
Terra foliata mercurialis	Mercury (II) acetate	<i>zī'baq mudabbar yuzīl al-āthār ṭilā'an</i>	KM, 52f, 12
<b>Vitriol derivatives</b>			
Tartarus vitriolatus	Tartar of vitriol	<i>ṭarṭīr al-zāj al-musta'mal fī al-inḏāj</i>	KM, 32v, 13
Vitriolum album vomitivum	Emetic white vitriol	<i>al-zāj al-abyaḍ al-muqayyi'</i>	KM, 33f, 20
Vitriolum veneris et martis	Vitriol of Venus and Mars	<i>zāj al-zuhra wa-l-marriḥ</i>	KM, 46v, 23
<b>Tartar derivatives</b>			
Cremor tartari	Cream of tartar	<i>qrimū ṭarṭīr</i>	KM, 33f, 10
Spiritus tartari	Spirit of tartar	<i>rūḥ al-ṭarṭīr</i>	KM, 40v, 14
Tartarus vitriolatus	Tartar of vitriol	<i>ṭarṭīr al-zāj</i>	KM, 32v, 13

TABLE 1 *Inorganic iatrochemical substances described in translated works (cont.)***Antimony derivatives**

Latin names	English names	Arabic names	
Acetate derivatives			
Crocus martis	Saffron of iron	<i>za'farān al-ḥadīd</i>	KM, 48r, 20
Sal Jovis	Salt of Jupiter	<i>milḥ al-mushtarī</i>	KM, 47v, 3
Saccharum Saturni	Sugar of Saturn	<i>sukkar zuḥal</i>	KM, 51v, 12

**Magisteria / Calcium derivatives**

Sal corallorum	Salt of corals	<i>milḥ al-marjān</i>	KM, 41v, 13
Sal margaritarum	Salt of pearls	<i>milḥ al-lū'lu'</i>	KM, 41r, 20

**Sulphur derivatives**

Lac sulphuris	Milk of sulfur	<i>laban al-kibrīt</i>	KM, 44v, 15
Flores sulphuris	Flowers of sulfur	<i>zahr al-kibrīt</i>	KM, 49v, 18

**Mineral spirits**

Spiritus salis	Spirit of salt	<i>rūḥ al-milḥ</i>	KM, 39r, 5
Spiritus salis nitri	Spirit of saltpetre	<i>rūḥ al-bārūd</i>	KM, 39v, 7
Spiritus vitrioli	Spirit of vitriol	<i>rūḥ al-zāj</i>	TK, 25v, 3
Spiritus tartari	Spirit of tartar	<i>rūḥ al-ṭarṭīr</i>	KM, 40v, 14
Spiritus vini tartarisatus	Spirit of wine tartar	<i>rūḥ al-sharāb ma' al-ṭarṭīr</i>	TK, 24v, 7
Spiritus sulphuris	Spirit of sulfur	<i>mā' al-kibrīt</i>	TK, 25v, 18
Spiritus salis ammoniaci	Spirit of ammoniac salt	<i>rūḥ al-nūshādar</i>	TK, 26r, 3

**Mineral oils**

Oleum plumbi	Oil of lead	<i>duhn al-usrub</i>	TK, 28v, 16
Oleum antimonii sacchari	Oil of sugar antimony	<i>antīmūn sukkarī</i>	TK, 29r, 3
Oleum auri	Oil of gold	<i>duhn al-dhahab</i>	TK, 29v, 8
Oleum argenti	Oil of silver	<i>duhn al-ḥiḍa</i>	TK, 30r, 1
Oleum perlarum	Oil of pearls	<i>duhn al-lū'lu'</i>	TK, 30r, 12
Oleum coralliorum	Oil of corals	<i>duhn al-marjān</i>	TK, 30r, 20

## Antimony derivatives

Latin names	English names	Arabic names	
Oleum salis	Oil of salt	<i>duhn al-milḥ</i>	TK, 29v, 2
Oleum sulphuris	Oil of sulfur	<i>duhn al-kibrīt</i>	TK, 29v, 16
Oleum vitrioli	Oil of vitriol	<i>duhn al-zāj</i>	TK, 30v, 1
Oleum tartari	Oil of tartar	<i>duhn al-ṭartīr</i>	TK, 30v, 11
Oleum cupri	Oil of copper	<i>duhn al-nuḥās</i>	TK, 31r, 5
Oleum ferri	Oil of iron	<i>duhn al-ḥadīd</i>	TK, 31r, 9
Oleum hydrargyri = Turpethum minerale	Oil of mercury	<i>duhn al-zī'baq</i>	TK, 31r, 16
Oleum arsenic	Oil of arsenic	<i>duhn al-zirnīkh</i>	TK, 31r, 20
Oleum talci	Oil of talc	<i>duhn al-ṭalq</i>	TK, 31v, 7
Oleum crystallorum	Oil of crystal	<i>duhn al-billawr al-ma'danī</i>	TK, 31v, 11
Oleum succini	Oil of amber	<i>duhn al-kahrabā'</i>	KM, 44r, 1; 28r, 15
Misc.			
Sal prunellae	Salt of prunella	<i>sālbūrnella</i> ,	KM, 39v, 15
Sal succini	Salt of amber	<i>milḥ al-kahrabā'</i>	KM, 39v, 22
Aurum fulminans	Essence of gold	<i>dhahab al-ra'd</i>	KM, 46v, 10

KM: Ibn Sallūm, *al-Kīmīyā' al-malakīya*

TK: Ibn Sallūm, *al-Ṭibb al-kīmīyā'ī al-jadīd*

ent in translated texts, or were they actually synthesised and used in medical practice? This question can be traced through the notes of Ibn Sallūm in his *Ġāyet ül-beyān* as he comments on the remedies he has applied himself with such remarks as *mücerrebdır* (tested) or *bizim mücerrebātımızdır* (we have tested it). A very important iatrochemical drug was cream of tartar (*ķurīmī ṭartarū*), used against melancholy, fever and constipation.<sup>100</sup> Further chemical preparations were spirit of vitriol (*rūḥ uz-zāc*), prunella salt (*sālpārūnīlā* or *selc ül-ḥukema*), prepared steel (*pūlād-ı müdebber*), saffron of iron (*zaferān el-ḥadīdī*), spirit of sulphur (*kibrīt şuyu*), sublimated sulphur

100 Ibid., ff. 136<sup>r</sup>, 263<sup>v</sup>, 286<sup>v</sup>, 287<sup>v</sup>.

(*zahr ul-kibrīt*), coral oil (*mercān yağı*), pearl oil (*incü yağı*), lapis lazuli oil (*lāciverd yağı*), amber oil (*kehrübā yağı*) and the sublimated ammoniac salt (*muṣaʿad niṣādırı*).<sup>101</sup> We may suppose that the glass of antimony (*antīmūnū ṣıçası*) and saffron of antimony (*zaʿferān-ı maʿdenī*) were also in use. Regarding mercury, Ibn Sallūm does not specify which mercury derivatives were applied.

Several recipes for chemical preparations that do not exist in the original texts of Oswaldus Crollius were integrated into the translated text of *al-Kīmīyāʾ al-malakīya*. This implies that the translator added these instructions to explain how to synthesise these chemical preparations, which were probably widely used. These are the preparation methods of cream of tartar (*qrīmū ʿartīr*), sublimated mercury (*zīʿbaq muṣaʿad*), flores antimonii or sublimated antimony (*antīmūn muṣaʿad*), glass of antimony (*zujāj al-antīmūn*), prunella salt (*sālbūrnīlā*), simple diaphoretic antimony (*antīmūn muʿarriq sādhaq*) and the essence of gold (*dhahab al-raʿd*).<sup>102</sup>

Other indicators of chemical remedies that might have been synthesised and applied in practice can be found in translated recipes in which the translator omitted, added or altered some specification in the work steps, such as materials, instruments, time limits etc. We conclude that at least the following preparations were synthesised by the translator: Gilla Theophrasti (*zāj jilāyiqī li-l-akhlāṭ al-ghalīza*), flowers of sulfur (*zahr al-kibrīt*), mineral turpeth (*mercurius praecipitatus, tarbadh maʿdanī*), red sublimated mercury (*zīʿbaq marjānī hulw*), the specific purgative of Paracelsus (*specificum purgans Paracelsi, mushil jāmiʿ min ṣanʿat Barākilsūs*), salt of amber (*milḥ al-kahrubā*), diaphoretic antimony (*antīmūn diyāfūritikūn*) and salt of corals (*milḥ al-marjān*).<sup>103</sup>

The use of iatrochemical remedies in medical practice would certainly be an interesting avenue of research, but this would require the study of appropriate sources like physicians' casebooks, purchase lists of apothecaries or prescription books.<sup>104</sup> Shefer-Mossensohn evaluated numerous "prescriptions made out by physicians and apothecaries for members of the Ottoman dynasty and high-ranking officials in the palace from the late seventeenth and eighteenth centuries" and arrived at the conclusion that the medical treatment remained

101 Ibn Sallūm, *Ġāyet ül-beyān*, MS Köprülü 1/975, ff. 131<sup>v</sup>, 188<sup>v</sup>, 193<sup>v</sup>, 194<sup>r</sup>, 261<sup>v</sup>, 273<sup>v</sup>, 286<sup>v</sup> (*rūḥ ul-zāc*); 137<sup>v</sup>, 193<sup>v</sup> (*sālpārūnīlā*); 137<sup>r</sup> (*pūlād-ı müdebber*); 253<sup>r</sup> (*zaʿferān ul-ḥadīdī*); 286<sup>v</sup> (*kibrīt şuyu*); 75<sup>v</sup> (*zahr ül-kibrīt*); 141<sup>v</sup>; 269<sup>r</sup> (*muṣaʿad niṣādırı*).

102 For further details on these preparations see Bachour, *Oswaldus*, pp. 177–191.

103 For further details on these preparations see *ibid.*, pp. 247–259.

104 In Efraim Lev's study on the trade in medicinal substance, four minerals are mentioned: alum, arsenic, sulphide, vitriol and ammoniacum (see Lev, "Trade," pp. 175–176).

based on “traditional botanical pharmacology.”<sup>105</sup> This result represents a contradiction between textual contents and medical practices and it would be interesting to explore this question in the future.<sup>106</sup>

## Conclusion

This contribution has examined some stages of the development and formation of medical chemistry in the Ottoman Empire during the sixteenth and seventeenth centuries. The medical encyclopedia *Tadhkirat ūlī al-albāb wa-al-jāmi‘ li-l-‘ajab al-‘ujāb* (*Memoranda of the Intelligentsia and Compendia of Curiosities*) by Dāwūd al-Anṭākī was investigated with regard to alchemical procedures for the preparation of remedies and the application of chemical medicines in treatment, especially in terms of applying minerals as internal medicines. Al-Anṭākī appears as an eclecticist who integrates magical, astrological, religious and alchemical elements into the framework of Graeco-Arabic medicine. He describes the preparation of mineral simples and compound remedies by alchemical procedures, such as sublimation, distillation, calcination etc., and administers sublimes, distilled spirits and oils in external and internal medicines, even mercury and sublimated mercury. Medical chemistry is an integrated part of al-Anṭākī’s medical encyclopaedia. However, the sources of his alchemical knowledge remain unexplored.

In addition, I addressed the translations from Latin into Arabic that were commissioned by Ibn Sallūm al-Ḥalabī. They introduced iatrochemical knowledge from established European medical compendia into the Ottoman Empire, thereby undergoing a transformation process of selection, pragmatism and assimilation on a textual as well as on a conceptual level. The assimilation process is most obvious with regard to Paracelsian ideas. Comparing the Arabic translation *al-Kīmiyā’ al-malakīyya* with its Latin original, i. e. the *Basilica Chymica* by the Paracelsist Oswaldus Crollius, reveals that the translator was not at all interested in Paracelsism, with its components of natural magic and its opposition to humoral pathology, but rather in the art of preparing cures using alchemical methods.

Finally, I investigated Ibn Sallūm al-Ḥalabī’s work *Ġāyet ūl-beyān fī tedbīr beden ūl-insān*. It represents a further integration of the knowledge that had

<sup>105</sup> Shefer, “An Ottoman Physician,” p. 144.

<sup>106</sup> See in this respect Günergun’s study on inorganic compounds in medical treatment (Günergun, 14–17. *Yüzyıllarda Osmanlı*).

been introduced through translations. Furthermore, the book illustrates the process of shaping Ottoman medicine by selecting elements from a variety of medical cultures and integrating them into its characteristic framework. Ibn Sallūm produces a collage recombining selected elements from translated Latin works, as well as Persian and Ottoman encyclopaedias and works of prophetic medicine. Besides, his personal comments enrich the compendium and illustrate everyday life in Istanbul with regard to diseases or the availability of drugs.

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